

the second degree. Bone mineral density (BMD) was determined by means of Dual-energy X-ray absorptiometer "Prodigy" (GE Medical systems). Index quality of bone (Trabecular Bone Score, TBS) was determined by programs Med-Imaps iN Sight, France.

Results: The results showed decrease TBS in group III aged 40-59 years compared with women in only osteoarthritis ($1,18 \pm 0,01$ and $1,31 \pm 0,02$ respectively $p < 0,05$). This indicates an earlier violation bone quality in comorbid pathology, possibly due to influence of hypertension on bone metabolism. In group III aged 60-80 TBS was decreased and did not depend on the disease. It shows the influence of the duration of menopause on bone quality.

Conclusion: The results point to necessity prescribe early treatment of violation bone metabolism in women III group aged 40-59 years.

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ANTHROPOMETRIC CHARACTERISTICS OF POSTMENOPAUSAL WOMEN DEPENDING ON APPENDICULAR SKELETAL MASS

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Objective: The aim of our study was to evaluate the anthropometric characteristics of the postmenopausal women depending on their appendicular skeletal mass.

Materials and methods: We've examined 8882 women aged 20-89 years (mean age – $56,7 \pm 0,14$ yrs; mean height – $162,5 \pm 0,07$ cm; mean weight – $73,5 \pm 0,16$ kg), taken anthropometric measures of 79 examined postmenopausal women aged 40-82 yrs (mean age – $63,53 \pm 1,08$ yrs, mean height – $157,54 \pm 0,79$ cm, mean weight – $74,75 \pm 1,68$ kg). Appendicular skeletal mass (ASM) was measured at all the four limbs with DXA. We've also calculated the appendicular skeletal mass index (ASMI) according to the formula: $ASM/height$ (kg/m^2). During the quartile analysis, depending on their ASMI parameters, the examined women were divided into the following groups: Q1 – $ASMI < 6,38$ kg/m^2 ($n=20$), Q2 – $ASMI = 6,38-6,83$ kg/m^2 ($n=20$), Q3 – $ASMI = 6,84-7,36$ kg/m^2 ($n=20$), Q4 – $ASMI > 7,36$ kg/m^2 ($n=19$). Anthropometric characteristics of the women were evaluated according to the V.V.Bunak's method (1941) modified by P.F.Shaparenko (1994). Lean and fat masses were measured with DXA using a Prodigy densitometer, GE. Statistical analysis was performed using the «Statistica 6.0» software.

Results: Frequency of sarcopenia in the group of women aged 65 yrs and older was 7 %. Quartile analysis of women taking into account their ASMI revealed that the women of Q1 and Q2 groups had the following anthropometric characteristics significantly reduced: weight (Q1 – 70,90 kg, Q2 – 70,25 kg, Q3 – 74,75 kg, Q4 – 85,53 kg; $F=5,24$; $p=0,002$), neck circumference (Q1 – 350 mm, Q2 – 357 mm, Q3 – 376 mm, Q4 – 393 mm; $F=5,68$; $p=0,001$), abdomen circumference (Q1 – 846 mm, Q2 – 936 mm, Q3 – 1008 mm, Q4 – 1106 mm; $F=11,52$; $p<0,0001$), shoulder width (Q1 – 903 un., Q2 – 963 un., Q3 – 1029 un., Q4 – 1078 un.; $F=2,22$; $p=0,09$), narrow tibia circumference (Q1 – 221 mm, Q2 – 227 mm, Q3 – 244 mm, Q4 – 248 mm; $F=6,44$; $p=0,0006$). We also observed a significantly lower thorax circumference in the Q1 group (Q1 – 903 mm, Q2 – 963 mm, Q3 – 1029 mm, Q4 – 1079 mm; $F=3,82$; $p=0,01$) in comparison with the women of Q4 group (Q1 – 903 mm, Q2 – 963 mm, Q3 – 1029 mm, Q4 – 1079 mm; $F=3,82$; $p=0,01$).

Conclusion: In women with a lower ASMI (Q1 and Q2 groups) the following anthropometric characteristics were significantly lower: weight, neck circumference, abdomen circumference, shoulder width, narrow tibia circumference. Thus, we can use anthropometric measures to determine groups with an increased risk of sarcopenia and its complications.

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BONE MINERAL DENSITY, SPINAL MICRO-ARCHITECTURE (TBS DATA) AND BODY COMPOSITION IN THE OLDER UKRAINIAN WOMEN WITH VERTEBRAL FRAGILITY FRACTURES

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Introduction: Osteoporosis and sarcopenia are the most frequent musculoskeletal disorders affecting older people. Fracture incidence as well as the number of fractures increase with population ageing. A low skeletal muscle mass is associated with the poor structural bone parameters and impaired balance in elderly people. The aim of this study is to evaluate the bone mineral density (BMD), trabecular bone score (TBS) and body composition in women taking into account the presence of vertebral fragility fractures (VFF).

Materials and methods: We've examined 171 women aged 65-89 years (mean age – $73,12 \pm 0,39$ yrs; mean height – $1,58 \pm 0,004$ m; mean weight – $72,54 \pm 0,99$ kg). The patients were divided into groups depending on presence of VFF: A – no VFF ($n=105$; mean age – $72,70 \pm 0,54$ yrs; mean height – $1,58 \pm 0,006$ m; mean weight – $74,43 \pm 1,33$ kg), B – present VFF ($n=66$; mean age – $73,79 \pm 0,55$ yrs; mean height – $1,58 \pm 0,008$ m; mean weight – $69,53 \pm 1,37$ kg). Total body, lumbar spine, femoral neck, forearm BMD, lateral vertebral assessment, trabecular bone score (L1-L4), lean and masses were measured by DXA densitometer (Prodigy, GE). Appendicular skeletal mass (ASM) was measured at all the four limbs with DXA. We've also calculated the appendicular skeletal mass index (ASMI) according to the formula $ASM/height^2$ (kg/m^2).

Results: We have found the following parameters to be significantly lower in women with VFF compared to women having no VFF: BMD of total body (A – $0,859 \pm 0,01$ g/cm², B – $0,764 \pm 0,02$ g/cm²; $p < 0,05$), spine (A – $1,038 \pm 0,02$ g/cm², B – $0,927 \pm 0,03$ g/cm²; $p < 0,05$), femoral neck (A – $0,787 \pm 0,01$ g/cm², B – $0,711 \pm 0,01$ g/cm²; $p < 0,05$), 33% forearm (A – $0,690 \pm 0,01$ g/cm², B – $0,600 \pm 0,01$ g/cm²; $p < 0,05$), TBS (A – $1,171 \pm 0,01$, B – $1,116 \pm 0,02$; $p < 0,05$), whole-body fat mass (A – $30736,87 \pm 939,92$ g, B – $25877,45 \pm 966,90$ g; $p < 0,05$), whole-body lean mass (A – $41202,44 \pm 498,18$ g, B – $39440,77 \pm 594,78$ g; $p < 0,05$), ASM (A – $16,47 \pm 0,22$ kg, B – $15,81 \pm 0,22$ kg; $p < 0,05$) and ASMI (A – $6,59 \pm 0,07$ kg/m², B – $6,34 \pm 0,09$ kg/m²; $p < 0,05$). The frequency of sarcopenia was 2% in women with no VFF and 14% in women with VFF.

Conclusion: Women with VFF have a significantly lower BMD, TBS, lean and fat mass compared to women with no VFF.

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IS TBS DIFFERENT IN HEALTHY EUROPEAN CAUCASIAN MEN AND WOMEN?: CREATION OF NORMATIVE SPINE TBS DATA FOR MEN

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Introduction: Trabecular Bone Score (TBS, Med-Imaps, France) is an index of bone microarchitectural texture extracted from antero-posterior spine DXA. In this cross-sectional analysis from two facilities in Ukraine and Spain, we have investigated the age-related changes of the lumbar vertebrae micro-architecture assessed by TBS in a cohort of Caucasian men and compare the results to TBS reference data for Caucasian women.

Methods: Subjects in the study were Ukrainian and Spanish men aged 40 and older with a BMD Z-score at spine L1-L4 within $\pm 2SD$. Individuals were excluded if they had fractures, were on any osteoporosis treatment and/or had any illness that would be expected to impact bone metabolism. All data have been obtained from GE-Lunar DXA devices (Prodigy and iDxa, Madison, WI, USA). Cross-calibration between the two centers was performed for TBS. TBS was evaluated at spine L1-L4 but also for all possible vertebrae combinations.

Results: A database of 368 men aged 40 to 90 years was created. TBS and BMD values at L1-L4 were poorly correlated with BMI ($r=0,16$ and $0,22$). TBS was poorly correlated with weight ($r=-0,1$) and height ($0,03$) whereas higher correlations were obtained for BMD ($r=0,3$ and $0,2$). TBS values obtained for all lumbar vertebral combinations decreased significantly with age. There was a linear decrease of 13.5% ($\sim -1,75$ T-score) in TBS at L1-L4 between 40 and 90 years of age in men while a decrease of 16.7% ($\sim -2,58$ T-score) was observed in women (Dufour et al., OI 2012). As opposed to women, there is no change in the rate of TBS decrease after 65 years in men.

Conclusion: This study established for the first time TBS age related curve in European men in the lumbar spine. The decrease seen in lumbar TBS reflects age-related micro-architecture texture changes at spine. Within the 40-65 age range, similar TBS decrease was observed in both Caucasian men and women ($p=0,8$). After 65, TBS decrease was significantly higher in women than men ($p < 0,01$). This study confirms the need to use gender specific reference data.

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TRABECULAR BONE SCORE (TBS) IN THE ASSESSMENT OF BONE MICROARCHITECTURE IN ACROMEGALY

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Purpose: Subjects with acromegaly (AG) suffers of increased bone fragility and, as reported in literature, have a higher prevalence for vertebral fracture even in subjects with normal BMD. Sparse information exists on the effect of AG on bone microarchitecture and no at axial sites. The aim of our study was to examine bone quality and quantity assessed by TBS and BMD in subjects with AG at lumbar spine.

Methods: In this longitudinal study 46 subjects with AG have been recruited (26 women and 20 men, mean age of 54.9 ± 11.5 years, BMI of 29.3 ± 4.2 Kg/m²). BMD and TBS were evaluated at lumbar spine (LS) using an iDxa DXA device (GE-Lunar) and TBS iNsight® (v2.1, Med-Imaps, France). Presence of vertebral fracture has been confirmed by Vertebral Fracture Assessment by DXA (VFA).

Results: Among all AG subjects, 41% were in active phase of the disease, 74% suffered from hypogonadism (Hy) and 22% sustained at least a fracture (Fx). BMD and TBS showed high correlation ($p < 0.0001$), with 49% of TBS explained by spine BMD. Subjects with Hy have a significant lower BMD and TBS ($p < 0.002$). Those with fracture have a lower TBS ($p = 0.02$) whereas no difference has been observed on spine BMD ($p > 0.5$). TBS and fracture were associated with an odd-ratio per one SD decrease of 2.64 [1.1-6.3] and an area under the ROC curve of 0,71 [0.56-0.84]. BMD, Age, presence of Hy, or duration of Hy were not associated with the presence of the fracture. Compared to normative TBS value, AG subjects have a significant TBS impairment (-6%, $p < 0.001$). Those with Hy or fracture have a lower TBS values when compared to normative values: -8% ($p < 0.001$) and -13% ($p < 0.02$) respectively.

Conclusion: This is the first study reporting changes in BMD and TBS at lumbar spine in subjects with acromegaly. AG induces bone microarchitectural texture impairment at lumbar spine. Presence of hypogonadism or fracture worsens this impairment. As previously obtained, TBS seems to be more sensitive to assess bone architecture impairment than BMD.

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TRABECULAR BONE SCORE IN HEALTHY AGEING

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Objective: To report values of Trabecular Bone Score (TBS) of healthy subjects and to highlight the link between TBS and conventional parameters of bone and body composition by dual-energy x-ray absorptiometry (DXA).

Methods: Two hundred and fifty patients of five age decades (from 20s to 70s, equally distributed for both age and sex) were prospectively recruited. Whole-body and regional densitometric body composition parameters (iDXA, GE Healthcare, USA), including estimate of visceral fat (VAT) assessed by a new software, lumbar DXA and TBS by iNsight (version 2.1) were considered. **Results:** A significant decrease of TBS was observed with ageing only in females, while BMD significantly decreased both in males and females. TBS values were slightly correlated with BMI ($r = 0.133$, $p < 0.01$), total lean mass in males ($r = 0.187$, $p < 0.05$) and total/regional fat mass in females ($r = 0.197$ - 0.223 , $p < 0.05$). However lumbar spine BMD ($r = 0.870$, $p < 0.0001$) predominantly influences TBS values.

Conclusions: This report revealed more influence on TBS by bone "quantity" compared to body composition parameters. Moreover the age and sex-specific reference curves for TBS could help clinicians to improve patient management in the detection of impaired bone mineral status and to monitor microarchitectural changes.

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MORPHOLOGICAL AND BONE STRENGTH INDICES IN GIRLS WITH ADOLESCENT IDIOPATHIC SCOLIOSIS AND THEIR CORRELATIONS WITH LEPTIN AND SOLUBLE LEPTIN RECEPTOR

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Objective: Previous studies suggested that leptin has profound effects on bone metabolism and growth. Abnormal leptin and soluble leptin receptor (sOB-R) levels and their correlation patterns with bone mineral density and trabecular bone micro-architecture were recently found to be distinct in girls with adolescent idiopathic scoliosis (AIS). Structural Model Index (SMI) and data derived from Finite Element Analysis (FEA) are important HR-pQCT parameters that can provide important information on the rod/plate-like configurations in the trabecular bone and bone strength respectively. This study aimed to compare the differences and correlations between SMI, bone strength indices and leptin and sOB-R between AIS and controls.

Material and Methods: 104 AIS girls aged 12 to 14 (Cobb angle $22.7 \pm 6.4^\circ$) and 82 age and gender-matched healthy controls were recruited. Subjects with BMI > 23.0 kg/m² were excluded. Anthropometric measurements including body height, body weight, sitting height and arm span were recorded. Sexual maturation was assessed with Tanner stages. SMI and bone strength parameters from FEA were determined at the non-dominant distal radius using HR-pQCT. Serum total leptin and sOB-R levels were measured with ELISA.

Results: Compared with controls, AIS subjects had higher sOB-R level ($p = 0.006$), higher SMI value ($p = 0.020$) reflecting more rod-like structures within the trabecular compartment, and numerically lower stiffness (-2.03%) and estimated failure load (-3.07%). Significant negative correlation was found between SMI and serum total leptin level in AIS ($r = -0.325$; $p = 0.003$) but not in controls ($p = 0.533$). Significant positive correlations were found between stiffness, estimated failure load, and serum total leptin in both AIS ($r = 0.278$, $p = 0.003$; $r = 0.268$, $p = 0.004$ respectively) and controls ($r = 0.462$, $p < 0.001$; $r = 0.468$, $p < 0.001$ respectively).

Conclusion: The higher SMI and numerically lower FEA derived bone strength parameters both reflecting decreased bone strength in AIS. The negative correlation between SMI and serum total leptin level was distinctly only detected in AIS, which indicated possible disturbance in leptin signaling affecting the trabecular bone of AIS. The results of this and previous studies provided strong evidences of deranged bone quality and bone strength and its association with abnormal leptin bioavailability and signaling in AIS.

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CORTICAL MEASUREMENTS OF THE TIBIA FROM HIGH RESOLUTION PERIPHERAL QUANTITATIVE COMPUTED TOMOGRAPHY IMAGES: A COMPARISON WITH MICRO-COMPUTED TOMOGRAPHY

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Objective: High Resolution-peripheral Quantitative Computed Tomography (HR-pQCT) measurements are carried out in clinical research protocols to analyze separately cortical bone and trabecular bone. Micro-computed tomography (micro-CT) is a standard tool for ex vivo examination of bone in 3D. The aim of this work was to evaluate cortical measurements derived from HR-pQCT images compared to micro-CT in a distal position with a sufficient amount of cortical bone (4.2 cm from the distal pylon).

Methods: Twelve tibia specimens were scanned with HR-pQCT using protocols provided by the manufacturer. The standard measured outcomes included volumetric bone density (mgHA/cm³) of the cortical region